

ART. XXXVIII.—*Further Coccid Notes : with Descriptions of New Species, and Discussion of Questions of Interest.*

By W. M. MASKELL, Registrar of the University of New Zealand, Corr. Mem. Roy. Soc. of South Australia.

[Read before the Wellington Philosophical Society, 18th December, 1895, and 26th February, 1896.]

Plates XVI.—XXIII.

THE LARVÆ OF COCCIDÆ.

IN order to gain a thorough knowledge of any family of insects it is desirable that the life-history of the species composing it should be studied as carefully as possible. As regards the habits of the insects, their manners and customs, or their influence upon plants or upon other animals, it is undoubtedly difficult for any one who does not live in their own country to properly investigate these points; and an observer who receives specimens from other lands than his own can scarcely be able to study them completely from this point of view. But at least it is desirable that when a new species is erected, or new observations are made upon known species, the insects under review should be examined as much as possible in all stages of life and in both sexes. In the case of *Coccidæ*, the males are unfortunately by no means generally available, especially when specimens are received for identification from a distance; for collectors are seldom careful to capture with the specimens attached to plants the small winged flies which they may see hovering about the females. Many instances, however, have occurred in my experience of males arriving in my hands either hatched out in transit or else in the pupa stage ready to emerge; and in this way I have been able to describe the males of many species. Larvæ, on the other hand, almost always accompany the adults; either they exist alongside of them on the leaves or they hatch out, sometimes in considerable numbers, even after the specimens have been a long time in the boxes. With the exception of the *Diaspidinæ*, where the specific differences in the larvæ are usually very slight (and in some cases even in that group), I have been careful to describe the larvæ of any new species erected by me, and also the second female stage and the male pupa whenever possible: for a mere hasty description of an adult, with perhaps very insignificant differences from other species, without any attempt to discuss other states which might throw much light on the relationships, seems quite inadequate for scientific purposes. Even in cases where there is no know-

ledge of the earlier states available I think the fact should be mentioned; and for this reason I have nearly always (except in the *Diaspidinæ*) inserted the words "Larva unknown" or "Second stage unknown."

It has occurred to me that a type-series of figures may not be useless as a guide to the study of Coccid larvæ, and two plates containing such figures are therefore attached to this paper, showing the abdominal extremities, the antennæ, and the feet of the eight principal sections into which the family is divided (Plates XVI., XVII.). I have purposely drawn these figures so as to include as far as possible the most important characters, without special regard to any particular species or even genus, though the variations in the four last groups have necessitated a double arrangement of the abdominal extremities. It will be seen, however, that in these double figures the differences shown are by no means fundamental: thus, for example, in the *Monophlebus* section of the *Monophlebinae* the difference from *Icerya* is merely in the number of the setæ, the principal character being identical in both—namely, the springing of the setæ from the last segment without any tubercles or lobes. As regards the feet, the general similarity in all the groups is apparent; and the point is to be noted that in every case the tibia is shorter than the tarsus. Morphologically, the antennæ also are similar throughout, having always six joints, the aberrant antenna of *Tachardia melaleucæ* really emphasizing the rule. I have given a figure of this antenna (Plate XVII., fig. 4d), partly on this account and partly to show its approach to the type-form of the *Diaspidinæ*.

Lest, however, I should be thought to mean that any of the types here shown is to be taken as so definitely fixed as to be rigid, I venture to repeat a passage in my paper of 1890 (Trans. N.Z. Inst., vol. xxiii., p. 32): "Whatever may be the rule amongst other orders and families of insects, Coccids present this difficulty to students: that one must be prepared at any time to find very distinct departures from generic, or even group, types, and to consider any character whatsoever as elastic and variable." *Tachardia melaleucæ* will again furnish an example of this, as the abdominal extremity of the larva is as aberrant as its antenna.

Note here, with regard to the foot, that in the *Monophlebinae* there is only one digitule on the claw. Note also that the appearance shown in Plate XVI., fig. 2b, where slight pressure has caused the anal ring to protrude some distance from the terminal cleft, is not infrequent in mounted specimens of Lecanid larvæ, although by no means constant. Signoret, in his "Essai," gives a similar figure in *Philippia oleæ*, a Lecanid. Note, finally, that in my Plates I have

omitted to show any marginal spines except on the anal tubercles, as these are in most cases only specific characters.

Synopsis of Larval Characters.

- Abdomen terminated by two or more minute subcylindrical lobes as in the adults; setæ not springing direct from the lobes; antennæ of six irregular joints; feet with tibia shorter than tarsus; digitules four *Diaspidinæ*.
- Abdomen distinctly cleft posteriorly; above the cleft two dorsal lobes not extending beyond the margin; lobes setiferous; antennæ of six regular joints; feet with tibia shorter than tarsus; digitules four ... *Lecaninæ*.
- Abdomen terminated by two conspicuous protruding tubercles; tubercles spiniferous and setiferous; antennæ of six regular joints; feet with tibia shorter than tarsus; digitules four ... *Hemicoccinæ*.
- Abdomen terminated by two conspicuous protruding tubercles; tubercles spiniferous and setiferous; antennæ of six regular subequal joints; feet with tibia shorter than tarsus; digitules four ... *Acanthococcinæ*.
- Abdomen terminated by two very inconspicuous tubercles, scarcely protruding; tubercles spiniferous and setiferous; antennæ of six regular joints, the last the longest; feet with tibia shorter than tarsus; digitules four ... *Dactylopinæ*.
- Abdomen terminated by two tubercles, conspicuous and protruding or small and not protruding; tubercles spiniferous and setiferous; antennæ of six regular subequal joints; feet with tibia shorter than tarsus; digitules four ... *Idiococcinæ*.
- Abdomen not terminated by any lobes or tubercles; setæ springing direct from margin; antennæ of six regular joints, the last the longest; feet with tibia shorter than tarsus; digitule one ... *Monophlebinæ*.
- Abdomen terminated by small tubercles, slightly protruding; tubercles setiferous; antennæ of six regular subequal joints; feet with tibia shorter than tarsus; digitules two ... *Brachyscelinæ*.

Genus ASPIDIOTUS.

Aspidiotus hakeæ, sp. nov. Plate XVIII., figs. 1-6.

Puparium of female circular, slightly convex; colour greyish-white; pellicles dark-orange, central; diameter about $\frac{1}{4\frac{1}{2}}$ in., but rather variable. The median portion is frequently rubbed off, leaving the pellicles exposed, with a ring of secretion.

Puparium of male circular, smaller and whiter than that of the female; diameter about $\frac{1}{6\frac{1}{2}}$ in.

Adult female orange-yellow; form normal of the genus, the thoracic segments overlapping the abdomen. Length about $\frac{1}{50}$ in. The abdomen is rather short and truncate; the margin is very minutely serratulate, but there are no terminal lobes, though in some specimens a small median club-shaped organ is visible within the margin. There are no groups of spinnerets, but a single row of separate circular orifices runs along the margin, and a few others are scattered over the body. The epidermis is very minutely striated, and thus presents a kind of velvety appearance.

Female of the second stage (the second pellicle) sub-elliptical, tapering posteriorly. The abdomen ends in two conspicuous median lobes, which are narrow, with straight parallel sides and emarginate ends; at each side, separated by a deepish depression, is a smaller lobe, bidentate and sloping towards the median lobes; at a short distance along the margin is another depression, and the whole margin is broken by serrations.

The first pellicle (the latest stage of the larva) is sub-elliptical, tapering posteriorly, and the abdomen terminates almost as in the second stage. But in this stage the exuviae of the antennæ and feet are clearly visible; moreover, close alongside the rostrum are two groups of spinneret-tubes, each group containing about thirty-five; these tubes end in circular simple orifices.

The larva (early stage) is dark-orange or red, elliptical, active; length about $\frac{1}{100}$ in. Antennæ and feet presenting no special features. The abdomen ends in two median conspicuous lobes, cylindrical and converging, the outer sides emarginate; between the lobes are two longish setæ. Close to the rostrum are the two groups of spinnerets as in the first pellicle.

The second stage, or pupa, of the male is dark-orange or red, elliptical; length about $\frac{1}{50}$ in. The abdomen has a minutely serratulate and thickened margin, but there are no lobes; the extremity is somewhat truncate. On each abdominal segment is a transverse row of large oval spinneret-orifices, which are on both the dorsal and the ventral surfaces.

Adult male dark-red; length, exclusive of the spike, about $\frac{1}{50}$ in.; the spike is about as long as the abdomen. Antennæ, feet, &c., presenting no special characters.

Hab. In Australia, on *Hakea* sp. My specimens were sent by Mr. Olliff, from Sydney.

This species may be recognised by the entire absence of abdominal lobes in the adult female, and their presence, conspicuously, in the pellicles; also by the groups of rostral spinnerets in the first pellicle and the large oval ones in the male pupa. In *Aspidiotus acaciæ*, Morgan, similar groups are seen near the rostrum, but in the adult state; and although the adult female of that species has very small and (apparently) not protruding lobes, yet these are present. I believe that *A. hakeæ* is clearly distinct.

***Aspidiotus virescens*, sp. nov.** Plate XVIII., figs. 7–10.

Puparium of female subcircular, flat, greyish-white; diameter about $\frac{1}{10}$ in. Pellicles subcentral; the larval pellicle is distinctly green, the second pellicle greenish in the middle and yellowish on the borders. The texture of the secreted portion of the puparium is thin and papery.

Puparium of the male subcircular, snowy-white, flat; the single pellicle subcentral, green. Diameter about $\frac{1}{20}$ in.; the texture very thin, delicate, and papery.

Adult female of the usual peg-top form; colour yellow, with a greenish tinge. Length about $\frac{1}{20}$ in. Abdomen ending in six subequal lobes, not set closely together; each lobe is narrow at the base, widened in the middle, and narrowed again towards the end; between the lobes, and extending along almost the whole abdominal margin, are very numerous broad scaly hairs, the ends of which are deeply serrated. There are four groups of spinnerets; upper groups with 17–21 orifices, lower groups with 8–13. Dorsally, there are great numbers of tubular spinnerets.

Adult male yellow, with a greenish tinge; length about $\frac{1}{40}$ in., exclusive of the spike, which is about half as long as the body. The organs present no distinctive feature.

Hab. In Australia, on *Eugenia smithii*. My specimens were sent by Mr. Froggatt; locality not named, but probably near Sydney.

This species may be distinguished by the terminal lobes and scaly hairs, as well as by the papery, thin puparia, and the distinctly green pellicles.

***Aspidiotus ficûs* (Riley), Comstock.** Rep. Entom. U.S. Dept. Agric., 1880, p. 296.

Occurs in India, on orange, at Khandallah. My specimens were sent by Dr. Alcock, Superintendent of the Indian Museum, Calcutta.

Aspidiotus cladii, Maskell, 1890.

I have lately received from Mr. A. Cooper, of Richmond, Natal, some pieces of aloe having on them several specimens of an *Aspidiotus* which is very clearly *A. cladii*. I have never before seen this insect from any place outside Australia, in which country it seems to be widely spread, as I have had specimens from nearly every portion of the continent. The species must have been taken to South Africa (I suppose) in some ship, perhaps on decorative plants for the saloon, or in a Wardian case. Mr. Cooper tells me that the aloe in question seems to be not seriously damaged; and I have not heard that *A. cladii* is injurious in Australia, although common enough. But this is a good instance of the way in which nowadays Coccids are being spread about the world; and, more than this, it is another nail in the coffin of that old fancy that Coccids may be recognised to some extent by their food-plants. Very probably *A. cladii* will be found ere long in other countries and upon all sorts of plants. Few people, I take it, will care in future to erect new species simply from finding insects on plants not hitherto known to have been attacked by them.

Aspidiotus eucalypti, Mask., var. **comatus**, var. nov. Plate XVIII., fig. 11.

Puparium of female circular, greyish-white, slightly convex; as in the type.

Puparium of male narrow, subelliptical, white, not carinated; as in the type.

Adult female of the general form, colour, and size of the type, with a similar characteristic deep groove. The abdomen ends in two conspicuous lobes, but these are not laterally incised, and there is also at each side a small, sharply-triangular lobe. The margin bears on each side ten rather long slender hairs, which are arranged in pairs, not singly as in the type. There are no groups of spinnerets.

Hab. In Australia, on *Eucalyptus viminalis*. Specimens from Melbourne, sent by Mr. French.

The non-incised lobes and the longer hairs in couples will distinguish this variety.

I find that in my original description of *A. eucalypti* I omitted to mention that the puparia (and the same holds good for the variety) are covered, when uninjured, by a very thin scale formed of the minute bark-cells of the tree. In this state the pellicles are very inconspicuous, and the whole has a grey appearance. Frequently, however, this scale is rubbed off, and then the pellicles are much more clearly visible, surrounded by a ring of whitish secretion.

A. articulatus, Morgan, 1889, comes near to *A. eucalypti*

in its characteristic groove, but its abdominal characters differ very clearly.

Aspidiotus perniciosus, Comstock; and a variety. Rep. Entom. U.S. Dept. Agric., 1880, p. 304.

This insect occurs in Australia on apples and pears. I have received specimens from Melbourne sent by Mr. French, and from New South Wales sent by Mr. Benson. It was reported in that country first by Mr. Olliff, in the *Agricultural Gazette of New South Wales*, 1892, p. 698.

In a paper forwarded to the *Entomologists' Monthly Magazine* I have discussed the relationships or differences between this species and *Aonidia fusca*, Mask., 1894.

In August, 1895, I received from Mr. Quinn, of Adelaide, some twigs of *Eucalyptus corynocalyx* thickly covered with insects which, after careful examination, I must attach to *A. perniciosus*. The puparia in this instance are very dark grey, and the larval pellicle is orange-red. The second pellicle is not visible until the scale is turned over, and then only indistinctly. But the characters of the adult female are quite clearly those of *A. perniciosus*, and in this case I have also the advantage of finding some adult males, which are identical with the figure of *A. perniciosus* given in "Insect Life," vol. vi., p. 369. Mr. Quinn says nothing about the presence of the insects on any European fruit-trees; but as to the *Eucalyptus* he remarks, "seems to destroy the bottom branches of young trees where it has been for a year or two."

It appears to me clear that *A. perniciosus* may vary a good deal in the colours of its puparia and of their pellicles. I have therefore placed this insect in my cabinet with the label "*A. perniciosus* var."; but I will not add the word "eucalypti," as I have no reason to think that it is peculiar to that family of trees.

Genus PARLATORIA.

Parlatoria myrtûs, Maskell. Trans. N.Z. Inst., 1890, p. 12.

I have received specimens of this insect from Adelaide, South Australia, on *Laurustinus*. They were sent by Mr. Quinn, who says, "fairly common on that plant, though its injurious effects are not very apparent."

Parlatoria zizyphi, Lucas. Lucas, Ann. de la Soc. Ent. de France, 1853; Signoret, *Essai sur les Cochenilles*, p. 133.

This insect has been sent to me by Mr. Lea, on lemons from Perth, Western Australia; the fruit was imported there

“from Sicily.” It has never before been reported, as far as I know, from any place south of the Line, nor indeed from outside Europe and Algeria, except that Comstock (Rep. 1883) says it is sometimes found in the United States on oranges in the markets.

Genus MYTILASPIS.

Mytilaspis acaciæ, sp. nov. Plate XIX., figs. 1, 2.

Female puparium mussel-shaped, slightly convex, and usually curved; colour dull dark-greyish-brown, scarcely lighter than the bark of the tree; length about $\frac{1}{16}$ in. Larval pellicle small, yellow, terminal; second pellicle very inconspicuous, reaching about one-fourth the length of the puparium.

Male puparium mussel-shaped, not carinated; colour of the secreted portion greyish-brown, lighter than that of the female; length about $\frac{1}{25}$ in. Pellicle terminal, small, orange-red in colour.

In all the specimens seen the female puparia were massed in great numbers on twigs, quite separate from the equally-numerous male puparia; and these latter, from their orange-red pellicles, presented altogether a more ruddy appearance than the former.

Adult female dark-brown, elongated, the general form normal of the genus; length about $\frac{1}{20}$ in. Abdomen ending in four lobes, of which the two median are the largest, and are rather wider than long, with the outer edges crenulated; between these and the two smaller lobes are small marginal depressions, with minute spines; the small lobes are cylindrical, with rounded emarginate outer edges; beyond them the margin of the abdomen is broken by many conical serrations bearing spines. There are no groups of spinnerets, but some oval large pores.

Adult male red; form normal, presenting no special features; length of body about $\frac{1}{45}$ in. The anal spike is as long as the abdomen.

Hab. In Australia, on *Acacia linifolia*. My specimens were sent by Mr. Froggatt, from Hornsby, near Sydney.

This is the species of which I remarked in my paper of 1894, under *Aspidiotus extensus*, that I possessed a number of male puparia but could not determine them in the absence of the females. Having received these I have no doubt of the genus of the insect, and from the absence of spinneret-groups, and from the characters of the abdominal margin, I do not hesitate to consider it as distinct. The separation of the males from the females is, as I remarked in 1894, a not very rare occurrence amongst Coccids.

Mytilaspis pallens, Maskell, 1889, var. *alba*, var. nov.

Puparium of female snowy-white, elongated, narrow; length about $\frac{1}{7}$ in. Pellicles terminal, pale-yellow.

Puparium of male similar to that of female, but smaller; not carinated; length about $\frac{1}{10}$ in.

Adult female as in the type.

Adult male not observed.

Hab. In Australia, on *Xanthorrhæa* sp. My specimens were sent by Mr. Froggatt, from Sydney.

I see nothing but the whiteness and the slightly larger size of the puparia to separate this from the type.

In my original description I mentioned as the food-plant of this species "a kind of fan-palm." I now find that the pieces sent were *Xanthorrhæa*: their triangular form misled me.

Mytilaspis banksiæ, sp. nov. Plate XIX., figs. 3-5.

Puparium of female dull-rusty-buff-coloured (similar to the underside of the leaf); convex, broadly pyriform and short; pellicles dull-red, usually covered by a thin scale of rusty secretion, which, however, is frequently rubbed off. Length of puparium about $\frac{1}{27}$ in. Many puparia are almost sub-elliptical.

Puparium of male similar in colour to that of the female, but much narrower and more cylindrical; not carinated; length about $\frac{1}{27}$ in.

Adult female dark-red, the median dorsal region sometimes yellow. Form normal of the genus, but frequently so much shortened as to be almost globular; the proper length is about $\frac{1}{35}$ in. Abdomen ending in six lobes, of which the two median are the largest, the outer ones the smallest. The median lobes are not quite adjacent; their sides are straight, the ends obliquely emarginate. The second pair are deeply incised on the outer edges; the third pair are bidenticulate. Between the lobes the margin has deep semicircular depressions with thickened edges, and beyond the lobes the margin is broken by many serrations. There are a few short scaly hairs between the lobes, and on the marginal serrations there are many others larger and longer; all these hairs have deeply-serrated ends. Five groups of spinnerets: upper group with 8-10 orifices; upper laterals 20-22, lower laterals 20-22. There are a great many dorsal spinnerets on all the segments as high as the rostrum, and on the anterior cephalic region are some short fine hairs.

Adult male dark-red; length (exclusive of the spike) about $\frac{1}{65}$ in.; the spike is about half as long as the body. The feet, antennæ, &c., present no special features.

Hab. In Australia, on *Banksia integrifolia*. My specimens

are from Mr. French, who collected them near Melbourne, "within full reach of the sea-spray."

I was long in doubt, considering the very short puparia and the almost globular form of some amongst the specimens sent to me, and also the numerous serrated scaly hairs on the abdominal margin, whether this insect ought not to be placed in the genus *Parlatoria*. But after careful examination I have concluded that the pellicles are always quite terminal, and the puparia really pyriform; and that the female is really elongate and not globular. Moreover, no species of *Parlatoria* has more than four groups of spinnerets. On the whole, therefore, I place the insects in *Mytilaspis*, having regard to the non-carinated male puparium.

This species may be considered as at least semi-aquatic, for Mr. French tells me the plants on which it was found are quite constantly wetted by the sea-spray.

Mytilaspis melaleucæ, sp. nov. Plate XIX., fig. 6.

Puparium of female elongated, pyriform, convex; colour of secreted portion greyish-white; pellicles terminal, dark-orange. Length of puparium about $\frac{1}{2}$ in.

Puparium of male elongated, subcylindrical, convex, not carinated; secretion white; pellicle terminal, orange. Length about $\frac{1}{2}$ in.

Adult female yellow, elongated. Abdomen ending with four very small lobes, not close together; the two median lobes are a little larger than the others and are cylindrical, with the ends rounded but emarginate; the outer lobes are conical. Margin of the abdomen broken by many small serrations, and bearing several short hairs, of which there are two between each pair of lobes. Five groups of spinnerets: upper group with 3 orifices; upper laterals 6-8; lower laterals 4-6. Several dorsal tubular spinnerets along the margin.

Adult male unknown.

Hab. In Australia, on *Melaleuca* sp. My specimens were sent by Mr. Froggatt, from Ballina, Richmond River, New South Wales.

The puparia of this species approach *M. casuarinæ*, *M. spinifera*, &c.; and also to *Poliaspis exocarpi*; but the abdominal characters differ from any hitherto described.

Genus CHIONASPIIS.

Chionaspis prunicola, Maskell, var. **theæ**, var. nov. Plate XIX., figs. 7-8.

I have received from the Indian Museum, Calcutta, some specimens which, after very careful examination, I must attach to *C. prunicola*. The female puparium is a little more elongated, and the anterior abdominal margin has fewer

spines; but in the terminal lobes and serrations the insect is identical with the type. The groups of spinnerets have usually more numerous orifices, the lower laterals having 36-42; but this is a very variable character in most *Diaspids*. Curiously, in three specimens examined the right upper lateral group was entirely absent, or was represented by only a single orifice.

Hab. In Northern India, on tea; no special locality was mentioned. If, as is quite possible, the tea-plants in question should have been imported from Japan, the relationships of this variety may be easily accounted for.

I have only lately been informed that Professor Sasaki, of Tokyo, has described my *C. prunicola* under the name of *Diaspis patelliformis*. In my original description (Trans. N.Z. Inst., vol. xxvii., p. 49) I mentioned how nearly the puparium approached that of a *Diaspis*, but gave reasons for not considering the species as of that genus. I have not yet had an opportunity of seeing Professor Sasaki's paper, nor do I know whether it has priority over mine or not. But I am obliged to adhere to my opinion for the present, and leave both the species and the variety in *Chionaspis*.

***Chionaspis spartinæ*, Comstock, var. *natalensis*, var. nov.**

Plate XIX., figs 9-11.

Puparium of female white, very elongated, narrow, sub-cylindrical; length about $\frac{1}{12}$ in.; width about $\frac{1}{50}$ in. Pellicles terminal, small, yellow.

Puparium of male white, elongated, cylindrical, carinated; length about $\frac{1}{30}$ in.

Adult female pale-yellow; form normal of the genus. Abdomen ending in four very small lobes, of which the two median are the largest; the two others are almost obsolete. The median lobes are roundly triangular, divergent; the outer pair are denticulate. The margin is broken by small serrations, and bears a few spiny hairs, of which two on each side are close to the median lobes. There are five groups of spinnerets: upper group with 10 orifices; upper laterals 20-24; lower laterals 16-20. Many large oval pores.

The larva is small, elliptical, active; length about $\frac{1}{100}$ in. The general characters are normal, but the last joint of the antenna is rather thicker and more clavate than usual amongst the *Diaspidinæ*.

Adult male unknown.

Hab. In Natal, on grass. My specimens were sent by Mr. A. M. Cooper, from Richmond, Natal.

This insect is very close to *C. spartinæ*, and I think the chief difference is in the numbers of the spinneret-orifices, which are fewer in var. *natalensis* than in the type. Com-

stock's species was found on "salt-marsh grass" much exposed to sea-spray. Mr. Cooper merely says "on grass," but does not mention the species.

Genus POLIASPIS.

Poliaspis exocarpi, Maskell.

This species appears to be by no means uncommon in Australia. I have had specimens during the year from various parts of New South Wales, on *Dillwynia ericifolia* and other plants.

There is one feature of this insect which is noticeable. I find that in all my mounted slides it is very difficult to detect the spinneret-groups. As a rule these are as clear (or nearly so) in all Diaspidæ when finally mounted in dammar or balsam as when examined in alcohol or water; but, of the four slides of *P. exocarpi* in my collection, there is only one which shows with any clearness at all the double sets of groups, and that by no means as clearly as could be wished. Specimens which, in alcohol, show the groups with perfect distinctness are almost useless for identification after the mount is completed.

Genus FIORINIA.

Fiorinia expansa, Maskell.

I have received many specimens of this handsome species from Mr. C. T. Musson, of Hawkesbury, New South Wales, on *Melaleuca linariifolia*. These are much larger than the original type, the puparia reaching $\frac{1}{16}$ in., but in other respects agree completely.

Section LECANINÆ.

Genus LECANIUM.

Lecanium scrobiculatum, Maskell. N.Z. Trans., vol. xxv., 1892, p. 221.; vol. xxvii., 1894, p. 58.

I find that this is a somewhat variable species, which is apparently not uncommon in New South Wales, principally on *Acacia*. Having received, since my paper of 1894 was printed, some specimens of the larvæ, I am enabled now to say that they do not differ from those of the form which in that paper I named *L. pingue*. Further, having had also another supply of *L. pingue*, I find that the feet are not really absent from that form, but are nearly atrophied, very small and somewhat swollen. Still further, Mr. Froggatt has sent me several specimens of an insect so closely resembling, in its anatomical characters, both of the above forms, although differing slightly in colour and in having no dorsal tubercles, that I am obliged to consider it as another variety.

For the foregoing reasons I have to abandon *L. pingue* as a distinct form and to classify the species anew as follows, regarding its general features:—

L. scrobiculatum, type.—Adult female convex, colour brownish-yellow or reddish-brown; epidermis bearing very numerous pits; feet not abnormally short; dorsum with four to six circular tubercles.

L. scrobiculatum, var. *pingue*.—Adult female convex, colour reddish-brown; epidermis bearing very numerous pits; feet atrophied; dorsum with four to six circular tubercles.

L. scrobiculatum, var. *leve*, var. nov.—Adult female convex, colour usually dull-yellow or brownish-yellow, with dull-red patches; epidermis bearing many pits (but less numerous than in the type); feet atrophied; dorsum without any circular tubercles.

The second stage of the female, the larva, and the test of the male pupa do not seem to vary sufficiently in these forms to require separate description. The first and third are described in my paper of 1892, and the larva in my paper of 1894 under *L. pingue*.

My specimens of var. *leve* were sent by Mr. Froggatt on *Acacia longifolia*, from Manly, near Sydney.

Lecanium mori, Signoret.

I have to report this species as plentiful on gorse (*Ulex europæus*) and broom (*Spartium* or *Genista*) at Fairlie, South Canterbury, New Zealand. My specimens were sent by Mr. T. Kirk.

I mentioned *L. mori* first in 1884 as occurring in New Zealand on *Alsophila*; and in 1893 here also on *Asplenium* and other ferns. The gorse and broom on which I now record it are, of course, European, and, if my recollection serves me correctly, there is not much, if any, native forest near Fairlie. The anatomical characters of the insects, as I observed in 1893, correspond most exactly with those of Signoret's species. The question arises as to the original country of *L. mori*. Signoret's specimens were found upon mulberry (presumably) in the south of France. That author does not himself mention the plant, and it is within possibility that "*mori*" is not meant to indicate the mulberry; but, however that may be, I have not found the species mentioned by any other writer as occurring in Europe or elsewhere. Neither Mr. Douglas nor Mr. Newstead reports it in England, although both have paid much attention to the genus *Lecanium*. Possibly, however, the species named *L. assimile*, Newst. (Ent. Mo. Mag., May, 1892, p. 141), may be the same or a variety. *L. genistæ*,

Sign., and *L. sarothamni*, Newst., differ sufficiently from it. The ferns on which *L. mori* occurs in New Zealand are indigenous species, and, in the case of *Alsophila* and *Nephrolepis*, are also of indigenous genera; and it is of course possible that some New Zealand ferns imported into the south of France and the Riviera may have taken their *Lecanium* with them.

Genus PULVINARIA.

Pulvinaria thompsoni, sp. nov. Plate XX., figs. 1-8.

Adult female at first yellowish-brown, darkening with age to red-brown or brown; frequently massed together on a twig, the cotton confused and heaped up, but on a leaf usually separate, with a posterior cylindrical white ovisac. The insect shrivels considerably at gestation, but in the early state reaches about $\frac{1}{6}$ in. The form is Lecanid, elliptical, flattish. Antennæ of eight joints, of which the third is twice as long as any other, the second and first next and subequal, the rest much shorter and about equal to each other; the eighth joint is irregularly tapering, and bears several hairs. Feet moderately large; the tarsal digitules are fine hairs, the digitules of the claw very large and widely dilated. Epidermis bearing a few circular spinnerets and also a few scattered short fine hairs; and on the margin is a row of similar fine hairs set rather closely together. Each of the marginal depressions bears three, or sometimes four, strong club-shaped spines. Abdominal cleft, lobes, and anal ring normal.

Female of the second stage yellowish or light-brown, elliptical, flattish; length about $\frac{1}{12}$ in.

Test of male pupa white, glassy and transparent, angular-elliptical, with sloping sides and the top formed of a flat plate; length about $\frac{1}{12}$ in.

Larva dull-red, flattish, elliptical; length about $\frac{1}{40}$ in. Antennæ of six joints. Abdominal setæ moderate.

Hab. In Tasmania, on *Dodonæa viscosa*. My specimens were sent by the Rev. Mr. Thompson, of Hobart.

This species differs from *P. dodonææ*, Mask., 1892, in the eight-jointed antennæ, in the larger digitules of the claw, in the very small number of dermal spinnerets, in the spines of the marginal depressions, in size, and in colour.

Pulvinaria tecta, Maskell.

Specimens of this have been sent by Mr. C. T. Musson, from Richmond, New South Wales; they are of the white, or New South Wales, variety, the Victorian specimens having yellowish cotton. These specimens are on *Daviesia ulicina*.

Section HEMICOCCINÆ.

Plate XX., figs. 9–17.

In 1883 I proposed (Trans. N.Z. Inst., vol. xvi., pp. 125–128) a classification of the Lecanid and partly Lecanid genera of the Coccid family, which seemed to me to possess at least the merits of clearness and simplicity. I followed this classification in my “Scale Insects of New Zealand,” 1887, and I have since seen no reason for departing from it. According to this system I separated from the Lecanids proper, without for that reason attaching them to the Coccids proper, certain genera in which the larvæ present distinct and conspicuous anal tubercles, while the later female stages have the abdomen cleft and two dorsal lobes not reaching the margin. I proposed to attach all such species as were naked to a subsection “*Kermitidæ*,” and all such as were covered with wax to a subsection “*Cryptokermitidæ*.”

During the past year I have received from Mr. Froggatt some specimens of a species which appears to belong to the *Cryptokermitidæ*, having a conspicuous test of waxy secretion. Unfortunately, I have only larvæ and females of the second stage, and therefore I am unable to name the species, or even to decide upon the genus in which it should be placed. But the characters of the two stages which I possess are so clear that I shall probably not err in at least attaching them to the *Cryptokermitids*; the larvæ have anal tubercles, and the second stage has the abdomen cleft, so that in all probability the adult will be cleft also.

The female of the second stage is orange-coloured, flat beneath and convex above, elliptical; length about $\frac{1}{11}$ in. The dorsum is raised in the middle in a longitudinal ridge of irregular tubercles or humps, and is covered with a test of white or yellowish wax, which is not homogeneous but broken up into irregular granular masses. At the margin (especially on the abdomen) this test is produced in spiny projections, and frequently also the dorsum has waxy spines. After treatment with potash the form is elliptical with a slightly wavy outline. Antennæ of seven short joints, subequal except the third, which is rather the longest; the last bears some hairs, of which one is rather long. Feet short and rather thick; the tibia and tarsus are about equal; digitules fine hairs. The dorsum bears many very small circular spinnerets. The margin has a row of short conical spines set rather closely together, and the four which are opposite the thoracic spiracles are very long and slender. The abdomen is distinctly cleft, and has the normal lobes of *Lecanidæ*; the anal ring has six long strong hairs, and after pressure frequently protrudes beyond the abdominal margin.

Larva orange-yellow, elliptical, slightly convex; length about $\frac{1}{6}\frac{1}{5}$ in. Dorsum sparsely covered with similar wax to that of the second stage. Antennæ of six rather confused short joints, of which the last bears some hairs. Feet moderate; the tarsus is almost, or quite, as long as the tibia. The margin of the body has the row of conical spines, and the four longer ones, as in the second stage. The abdomen ends in two conspicuous and prominent anal tubercles, each of which bears a few fine spines and is terminated by a long seta.

Hab. In Australia, on *Banksia serrata*. My specimens were sent by Mr. Froggatt from Manly, near Sydney. I have asked him to procure, if possible, some adults, in the absence of which I can decide neither the genus nor the species, though there seems every probability that it will be a *Kermes*.

Group COCCINÆ.

Genus PROSOPOPHORA.

Prosopophora atherospermæ, sp. nov. Plate XXI., figs. 1-8.

Adult female covered by a rather thick waxy test, which is of a nearly brick-red colour, slightly elliptical and convex; length about $\frac{1}{10}$ in. There is a median longitudinal raised ridge of small tubercular swellings, each corresponding to a segment of the insect; on each side of this are two other similar but smaller longitudinal ridges; and, the shallow depressions in all the ridges being continuous, the test has the appearance of being transversely, and somewhat conspicuously, corrugated and barred. The apex of each small tubercle is lighter-coloured than the rest. Sometimes, however, the whole test is almost or quite white: this may possibly be due to incipient parasitism, although I can find no difference in the enclosed females. The ventral surface of the test is a flat plate of wax, with a perforation for the insect's rostrum. At the posterior extremity, dorsally, there is a small orifice, with somewhat protruded and raised edges. There is no marginal fringe; but in some specimens a small quantity of white cotton may be seen beneath the edge of the test.

Test of male pupa waxy, darkish-yellow, cylindrical; length about $\frac{1}{20}$ in. Dorsally it has rows of small tubercles like those of the female, but these are proportionately smaller in comparison with the depressions, so that the test is more conspicuously corrugated transversely, with the exception of the posterior region, which is a flat sloping plate, hinged for egress of the male.

Adult female dark-red; filling the test, but shrivelling at gestation. Form slightly elliptical, convex dorsally. An-

tennæ of eight subequal joints; the third is sometimes rather longer than the others; on the last joint are several hairs, and there is one on the seventh. Feet entirely absent. Rostrum moderate; mentum monomerous. Abdomen ending with two divergent, rather large, anal tubercles, each bearing a shortish seta but no spines; close alongside each tubercle is a longer seta; each tubercle has its dorsal surface striated with a reticular pattern. The margin of the body has two small depressions at each side opposite the thoracic spiracles, and in each depression are two club-shaped spines, one of which is twice as long as the other. Epidermis bearing great numbers of dorsal tubular spinnerets, the bases of which spring from very minute figure-of-eight orifices. Anal ring with several (probably ten) hairs, and anterior to it are two rows of large circular multilocular glands (perforated discs).

Second stage of female not observed with certainty.

Larva dark-brown, but externally appearing greyish, being covered with whitish granular wax. Form elliptical, tapering posteriorly to two prominent but rather small tubercles. Length at first about $\frac{1}{50}$ in., but later attaining $\frac{1}{30}$ in. Antennæ apparently of six subequal joints. Feet moderately strong. The anal tubercles are striated as in the adult, and bear moderate setæ.

Male pupa and adult male unknown.

Hab. In Australia, on *Atherosperma moschata* (sassafras). My specimens were sent by Mr. French, from Black Spur, Fernshaw, Victoria. He says, "covers the bark of the tree for yards up, but does not seem to have done any damage."

This species is much nearer to *P. dendrobii*, Douglas, than either of the other two Australian species, *P. eucalypti* and *P. acaciæ*; and, indeed, I am strongly tempted to consider it as a variety only. It differs from Douglas's insect, which is on orchids in Demerara, in the colour of the test, in the absence of spines and the reticulation of the anal tubercles, and in the absence of any "perforated discs" on the cephalic region. It is a pretty insect, and for the present I shall leave it as distinct.

Genus PLANCHONIA.

Planchonia quercicola, Bouché. *Asterolecanium quercicola*, Bouché, Ent. Zeit, Stettin, 1851; *Asterolecanium quercicola*, Signoret, Ann. de la Soc. Ent. de France, 1868, p. 279.

In February, 1895, I received from Mr. R. I. Kingsley, of Nelson, some twigs of oak from that place thickly covered with many thousands of Coccids, clearly belonging to the genus *Planchonia*; and on examination they were found to be entirely identical with specimens of *P. quercicola* sent to me in 1881 by Dr. Signoret, from France. I do not propose

to reopen now the discussion of the generic name, as to which I have somewhat fully expressed opinions previously; but I shall merely refer to my remarks on the subject in these Transactions, and in the "Annals and Magazine of Natural History," August, 1895, p. 134.

It is somewhat curious that the occurrence of this pest on the Nelson oak-trees has never before been made known. The twigs which were sent to me were so thickly covered with the little greenish-yellow tests as to be in places invisible. In Mr. Kingsley's letters he informs me that "the owner first noticed the blight about fourteen years ago." It would appear from Signoret (*loc. cit.*) that *P. quercicola* was first observed as an injurious pest about 1836, near Paris, and that certain oaks in the Bois de Boulogne were then practically destroyed by it. I have not found any particular mention of it, either in France or elsewhere, since Signoret wrote, as being especially common or injurious, although it has been reported several times in Europe and in America. It is difficult to look at the Nelson oak-twigs without fancying that the countless thousands of insects on them must greatly damage the trees; and yet all that Mr. Kingsley tells me is that "the upper branches of the trees look somewhat unhealthy." This is after fourteen years' uninterrupted existence. Probably, in Europe there is some parasitic enemy (not generally known) which has kept it in check, and some accidental disappearance of the parasite may account for the prevalence of the *Planchonia* in 1836. In New Zealand, apparently, either there is no parasite, in which case the *Planchonia* will be able to increase indefinitely, or whatever parasite there may be has for a while disappeared, with the consequent outbreak of the Coccids.

Coccids, like other insects, are subject to sudden and injurious increase at irregular intervals. Just in the same way as in England a few years ago there was an extraordinary swarm of the butterfly *Colias edusa*, so in New Zealand at one time *Lecanium hesperidum* was for a few years excessively numerous. In Mauritius and other tropical places *Aspidiotus destructor* broke out at one time with unusual vigour; and we can remember here how in the summer of 1894-95 occurred an alarming increase of *Dactylopius adonidum* in the Hutt Valley, an increase which may perhaps be observed again during the present season. If, therefore, *Planchonia quercicola*, after being fairly quiescent for several years, has of late suddenly started into abnormal activity, we may expect that after a while the checks (whatever they may be) to its increase will again act on it, and it will return to comparative harmlessness.

There remains, of course, the chance that the insect is not

particularly injurious, although, as remarked just now, it is difficult to think this in view of its immense numbers.

In a later letter Mr. Kingsley says, "It does not appear to be increasing. . . . The owner has cut off and burnt from time to time the most-infected branches. . . . One tree at Bishopdale is getting very bad. . . . In the city two trees are infected, but do not yet show signs of decay. . . . Most of the oaks do not appear to be much the worse for it. . . . I do not know of any spraying operations."

In a still later letter (February, 1896) Mr. Kingsley tells me that the trees are beginning to show signs of much damage by this insect, and that it is feared in Nelson that a large proportion of the fine oaks in that district will be most seriously injured.

Genus *ERIOCOCCUS*.

***Eriococcus spiniger*, sp. nov.** Plate XXI., figs. 9–11.

Sac of female white, or with a very faint yellowish tinge; cylindrical; texture very closely felted. Length about $\frac{1}{16}$ in.

Sac of male similar to but smaller than that of the female; the texture is perhaps somewhat looser.

Adult female brown or yellowish-brown, filling the sac but shrivelling at gestation. Abdomen ending in two conspicuous but narrow cylindrical anal tubercles, each bearing several short spines and terminated by long setæ. Antennæ of six joints, of which the third and the sixth are the longest. Feet rather slender; tibia a little shorter than the tarsus; all the four digitules are fine hairs. The epidermis bears great numbers of circular spinnerets of two sizes, and also very short fine spiny hairs. On the margin there is a row of strong spines with tubercular bases and blunted ends; these spines are not in a continuous row, being separated according to the segments of the body; each cephalic and thoracic segment bears on each side fourteen to sixteen spines, and each abdominal segment five on each side. From these spines springs a fringe of white tubes, which may be seen within the sac before gestation. The anogenital ring has eight hairs.

Second stage of the female not observed.

Larva yellowish-brown, flattish, elliptical, active; length about $\frac{1}{10}$ in. Antennæ and feet normal. The margin bears a row of strong spines as in the adult, but a little more slender, and more acute at the tips.

Adult male unknown.

Hab. In Australia, on *Eucalyptus* sp. Mr. Froggatt sent me specimens from Oatley, near Sydney.

The arrangement and size of the marginal spines distinguish this species.

Eriococcus buxi, Fonse., var **australis**, Maskell. Trans. N.Z. Inst., vol xxvii., p. 65.

I have received from Mr. Froggatt some specimens which I shall attach to this species, the principal difference from the type being apparently only the size. The female sac is only about $\frac{1}{2}$ in. long, and the male sac still smaller. There seem to be no other distinguishing characters.

Hab. In Australia, on *Trachymene billardieri*. Specimens from Sydney.

Eriococcus paradoxus, Maskell. Trans. Roy. Soc. South Australia, 1887–88, p. 104.

Specimens received from Mr. G. Quinn, of Adelaide, on *Pittosporum bicolor*, belong to this species. Mr. Quinn says, "This is most destructive on this genus, and the gardener at Government House has burnt a number of the shrubs in consequence, and cut out large quantities of branches of the others." My original specimens were on *Pittosporum undulatum*.

Genus DACTYLOPIUS.

Dactylopius adonidum, Linn.

In the "Annals and Magazine of Natural History," August, 1895, I published some remarks on the genus *Dactylopius*, and mentioned an outbreak of *D. adonidum* in the Hutt Valley, near Wellington. I have received specimens from Mr. Froggatt, of Sydney, New South Wales, on *Acacia linifolia*, which I also attach to this species, although in colour they are browner, or redder, than usual. Probably there is no character which serves for differentiating *D. adonidum* from others of the genus better than the sequence of the antennal joints. The insect is apparently omnivorous and cosmopolitan.

Dactylopius longifilis, Comstock. Rep. Entom. U.S. Dept. Agric., 1880, p. 344.

This insect occurs on *Croton*, at Calcutta, and in all probability elsewhere in India. Specimens were sent to me by Dr. Alcock, of the Indian Museum.

Genus LACHNODIUS, gen. nov.

As the study of Coccids progresses forms are constantly being found which in some character or characters depart from the generic types hitherto known. Sometimes the variations are but slight and unimportant, and in such cases it has been my rule to leave the species in a known genus without proposing or suggesting its future removal therefrom. Sometimes the abnormal characters have seemed to me fundamental, and I have established new genera on single species;

in these cases, *e.g.*, *Poliaspis*, *Inglisia*, *Sphærococcus*, other species have soon been discovered, which proved the correctness of my view. Sometimes, again, I have reported certain variations and remarked that, if at a future time new insects exhibiting them should be reported, it would probably be necessary to erect a new genus for them.

Such a case as the last occurred in 1891 with the form which I named *Dactylopius eucalypti*. Certain features in this departed from the type of *Dactylopius*, but I preferred to wait for the discovery of some others with similar characters before removing *D. eucalypti* from that genus. Two such forms have now come under review, and I therefore propose to set them apart under the name *Lachnodius*, which will indicate one of the principal characters—the excessive pubescence of the anogenital ring.

LACHNODIUS, gen. nov.

Female insects active or stationary; naked, or covered with cottony or mealy or waxy secretion. Body segmented. Antennæ of seven or eight joints, of which the last is not longer than the others. Mentum monomerous. Anal tubercles small or obsolete. Anogenital ring with more than eight hairs.

Male insects normal of *Dactylopinæ*.

The seven-jointed antenna would not in itself be a distinctive character, but the shortness of the last joint, the monomerous mentum, and the hairs of the anal ring are quite sufficient.

Lachnodius eucalypti. *Dactylopius eucalypti*, Maskell, 1891, Trans. N.Z. Inst., vol. xxiv., p. 35.

The original description of this insect need not be here repeated. Further notes regarding it will be found in vols. xxv., xxvi., xxvii. of the Transactions. I am satisfied now that the mentum is monomerous.

Lachnodius lectularius, sp. nov. Plate XXI., figs. 12–19.

Adult female dark-red or reddish-brown, elliptical, very convex, distinctly segmented; length averaging about $\frac{1}{2}$ in., but some specimens seen reach almost $\frac{2}{3}$ in. The twig beneath the insect is usually somewhat swollen and widened, and also hollowed out, forming a bed for the insect. The margin is generally somewhat flattened, but this is not noticeable in all specimens. The ventral surface is convex, filling the hollow in the twig, but at gestation the insect becomes itself hollow, and the under-surface then appears as if honeycombed, from the numerous wrinkles formed by the shrinking of the ventral epidermis. Antennæ of seven joints,

of which the third is much the longest, the fourth the next, then the second and first which are subequal, the fifth, sixth, and seventh the shortest and subequal, the seventh probably the shortest of all. Each joint bears some short fine hairs; the first has also one and the second two much longer and thicker. Feet rather strong; the coxa, trochanter, and femur rather thick; the tibia about twice as long as the tarsus; both tibia and tarsus are much wrinkled, and the tarsus is curved; claw moderate; all the four digitules are fine hairs. There are several short spiny hairs on each joint of the foot, and on the trochanter are two very long and thick. Rostrum small; mentum monomerous, subcircular; setæ very short. The abdomen terminates in a curve without any appearance of anal tubercles, nor are there any special terminal hairs. Anal ring large, compound, bearing from twenty to twenty-four long strong hairs. The margin of the body has a series of long and strong spines set closely together; each spine springs from a projecting tubular base, which is ringed. Epidermis bearing many short fine hairs, and near the cephalic and abdominal extremities are two curved series of stronger spiny hairs, about sixty in each. On the abdominal segments there are great numbers of very minute subcircular marks which seem like the orifices of spinnerets, but of the twenty-five specimens observed none exhibited either cotton or wax. In some specimens there are two strong short conical spines set close together between the antennæ, but these are apparently not constant.

Female of the second stage yellow or yellowish-brown, elliptical, convex, segmented; length about $\frac{1}{8}$ in. Antennæ of six joints, which are proportionately thicker than in the adult; of these the third is much the longest. Feet, marginal spines, and anal ring as in the adult; but instead of one pair of strong conical spines there are many such pairs—apparently twenty-four in all.

Larva yellow, subcircular or broadly elliptical, slightly tapering posteriorly; length about $\frac{1}{80}$ in. Antennæ short, thick, with six subequal joints. Margin bearing a series of strong conical spines set closely together; these are proportionately shorter than those of the adult, but their points are produced into very long fine threads forming a delicate fringe.

Hab. In Australia, on *Eucalyptus rostrata*. Mr. French has sent me a number of specimens, and says, "It does great damage to young trees at Mooroopna, Goulburn River, Victoria."

L. lectularius may be distinguished from both the preceding and the following species by the much longer marginal spines both in the adult and the larval stages. From *L.*

hirtus it likewise differs in its very much slighter dorsal pubescence. I am not prepared to say that in its natural state it may not produce some cotton, although none of my specimens has any.

I find I have omitted to say that the adult male and the male pupa are unknown.

***Lachnodius hirtus*, sp. nov.** Plate XXII., figs. 1-9.

Adult female dark-purple, but covered with a quantity of very short white filaments rising from the dorsal hairs, so that the general appearance is grey; form subglobular; diameter about $\frac{1}{5}$ in. or $\frac{1}{4}$ in. before gestation. Dorsum covered with great numbers of short but rather strong brown hairs, which give it a woolly appearance. Antennæ of seven joints, of which the third is the longest, then the fourth and second, next the first, and the last three are the shortest and equal; the last joint is not elongated. All the joints bear a few hairs, the last having several. Feet long and strong; coxa, trochanter, and femur large and thick; tibia cylindrical, three times as long as the tarsus, and bearing on the inner edge several strong spines and at the tip two spurs; tarsus short and thick, with two slender spines on the inner edge; claw short and broad. There are no digitules either on the tarsus or on the claw. The anogenital ring has about twenty hairs. The mentum is large and monomerous. The abdominal extremity is rather truncate, and there are no anal tubercles; but two of the hairs on the extreme margin are a little longer than the rest.

Second stage of the female not observed.

Larva reddish- or yellowish-brown, active, elongated, tapering posteriorly; length about $\frac{1}{4}$ in. Abdomen ending in two very minute anal tubercles, each bearing a long seta. Antennæ of six rather thick joints, of which the third and the sixth are the longest; on the last joint are several hairs, of which one is much longer than the rest. Feet long and rather slender; tibia rather more than half as long as the tarsus; claw very small and slender. There are four digitules, all of which are fine hairs. The dorsum is covered with many fine hairs, and on the margin there is a row of strong spines, of which the two which are between the anal tubercles are double.

The male pupa is covered by a white cylindrical sac of white cotton, about $\frac{1}{4}$ in. long. The enclosed insect has not been observed.

Adult male unknown.

Hab. In Australia, on *Acacia* sp. My specimens are from Mr. Froggatt; I believe the locality to be Thornley, near Sydney. As, however, the adult female is quite apt for

wandering there will probably be many plants and places where it may be found.

The excessive pubescence and the strongly spined and spurred tibia will distinguish this species.

Genus SPHÆROCOCCLUS.

Sphærococcus inflatipes, Maskell, var. **simplicior**, var. nov.

Adult female occupying a small depression in the bark, and covered by a flattish subcircular test, which is scarcely raised above the bark, and, being of the same substance and colour, is very inconspicuous, seeming as if only a small blister.

Adult female of the general form of the type, subcircular, slightly depressed dorsally and slightly convex ventrally; diameter about $\frac{1}{30}$ in. dorsally. The antennæ are much more atrophied than in the type, the joints being quite confused, and the whole organ appearing more tubercular. The two anterior pairs of feet are also much smaller than in the type, being, indeed, in some cases scarcely to be made out; the large and long posterior pair, on the other hand, are perhaps a little more exaggerated than those of the type, and the claw is much more distinct. The dorsal region bears, as in the type, very great numbers of small oval markings and very short fine hairs, but instead of a ring of strong spines encircling the whole there are only about six at the posterior extremity, with three or four much smaller ones at each side of them. The ventral hairs and orifices are as in the type.

This variety is distinguished by the very inconspicuous test, by the smaller antennæ and anterior feet, and by the difference in the dorsal spines.

Hab. In Australia, on *Eucalyptus viminalis*. Specimens sent by Mr. French from Melbourne. These specimens were accompanied by numbers of *Aspidiotus eucalypti*, var. *comatus* (of this paper); and in examining a twig it is necessary to carefully distinguish the puparia of the *Aspidiotus* from the tests of the *Sphærococcus*.

Sphærococcus obscuratus, sp. nov. Plate XXII., figs 10–17.

Adult female covered by a swelling of the bark of the tree, which is frequently much coated with black fungus, and is very inconspicuous. On lifting off the bark the insect is seen lying on the wood in the cavity; sometimes it is partially or almost wholly enclosed in the exuviae of the second stage, sometimes the upper portion of the exuviae is lifted away with the bark and the lower half forms a cushion on which the insect rests.

Adult female dull-red or yellowish-red or brownish, globular or subelliptical; diameter about $\frac{1}{26}$ in. Abdomen distinctly segmented. Antennæ variable; in some species they are almost if not quite wanting, being reduced to a mere tubercle; in others they are short and swollen, with very confused joints (three? or six?) difficult to separate. Feet entirely absent. Mentum distinctly biarticulate, rather large, and bifid at the tip. There are four large thoracic spiracles, each surrounded by a ring of circular glands. The epidermis bears many small simple circular spinneret-orifices; and on the last three abdominal segments are some larger orifices. Anogenital ring small, simple, hairless. The whole body is much wrinkled; and on the dorsal abdomen there are four very strong transverse chitinous bands, broad in the middle and tapering to points at the ends; the outer margin of each band is smooth, the inner bearing on each side from four to eight conspicuous crenulations. On the cephalic and thoracic margins are some short spines.

The female of the second stage is circular, flattish dorsally and ventrally, or subglobular; diameter about $\frac{1}{20}$ in., being thus rather larger than the adult. The colour is a dull-yellow or grey. The rostrum and mentum are large; the antennæ nearly completely atrophied. Feet absent. The abdominal region has not been accurately observed, but I see no trace of chitinous bands.

Larva subelliptical, flattish, active; length about $\frac{1}{85}$ in. Abdomen ending in two conspicuous protruding anal tubercles bearing spines and setæ. Antennæ of six rather thick and somewhat confused joints, of which the fourth and fifth are the shortest. Feet also rather thick; all the four digitules are fine hairs. In its later state the larva becomes more elongated.

Male pupa enclosed in a felted, yellowish, cylindrical sac which has a small orifice at the posterior end; length of the sac about $\frac{1}{25}$ in. I have not observed the pupa itself.

Adult male unknown.

A minute scarlet Gamasid mite, about $\frac{1}{80}$ in. in length, is very active in the burrows of this Coccid. I do not know how far it may be occupied in feeding on the *Sphaerococcus*, but possibly the difficulty which I have found in getting any quite complete specimen of the second stage may be due to the action of this mite. I have not observed any eggshells in the cavities examined, though the insect is not, as far as I can make out, viviparous; and this again may be due to the appetite of the Gamasid.

Hab. In Australia, on *Acacia longifolia* and on *Eucalyptus obtusiflora*. Specimens on both plants have been sent by Mr. Froggatt from Hornsby, near Sydney.

This species, in the wrinkled abdomen and the transverse markings, approaches both to *S. bambusæ*, Mask., 1892 (Sandwich Islands), and to *S. melaleucæ*, Mask., 1893 (Australia); but it is very clearly distinct from both. The broad and conspicuous chitinous bands are a quite distinctive character.

Genus ICERYA.

Icerya nudata, sp. nov. Plate XXIII., figs. 1-6.

Adult female yellowish-red in the anterior regions and brick-red on the abdomen; covered with thin white meal, but not forming any ovisac. Body very thick, with a convex dorsum and swollen ventral region; the dorsal and ventral portions are separated by a lateral ridge. Antennæ of ten joints, of which the last, the first, and the third are the longest, then the second and fourth, the rest shorter and equal; a few hairs on all the joints, and on the tenth are four much longer than the others. Feet black and rather strong; all the joints, coxa, trochanter, femur, tibia, and tarsus bear on the inner side numerous rather strong spines; the tarsal digitules are short fine hairs, digitules of the claw represented by short thick bristles. The epidermis is covered with many very fine short hairs interspersed with very minute circular multilocular orifices, and along the lateral ridge there are also many rather larger ones; also on this ridge are many rather longer hairs, which are most numerous at the abdominal extremity. The length of the insect is about $\frac{1}{5}$ in., the height at gestation about $\frac{1}{4}$ in.

This insect is viviparous, and a number of larvæ can be found within the body, so that an ovisac is not required.

Larva dark-red, the feet and antennæ black. The form is normal of the genus, elliptical, slightly tapering; length about $\frac{3}{5}$ in. Antennæ of six joints, the last of which is about as long as the third, fourth, and fifth together; it is regularly clavate, without any basal swelling or median constriction, and bears four very long hairs. The abdomen ends with the usual six small tubercles, from which spring very long setæ, almost as long as the body. The whole margin also bears numerous setæ, of which those on the anterior thorax are the longest, diminishing gradually posteriorly except the pair just anterior to the terminal six, which are as long as those on the thorax. Epidermis bearing circular multilocular orifices which are disposed in longitudinal rows; from these is produced some white cotton, usually visible in patches on the dorsum. Feet presenting no special features.

Female of the second stage, and male, unknown.

Hab. In Australia, on *Cosmos*, *Verbena*, &c. Mr. Olliff sent me specimens from Sydney, stating that the insects were "said to be doing very considerable injury."

I have been unable to attach this insect to any known species. In the absence of an ovisac and the consequent viviparous propagation it approaches *I. rosæ*, Riley and Howard, 1890; but both adult and larva differ from that species, of which I have reported a variety *australis* in 1893. There is an insect, *I. palmeri*, Riley and Howard, 1890, of which the adult female is not yet known, and I at first thought that it might be this Sydney one; but the larva of *I. palmeri* has the last joint of the antenna conspicuously swollen at the base and constricted in the middle; and the larval marginal hairs also differ.

Since 1892, when I inserted in my paper (Trans. N.Z. Inst., vol. xxv., p. 246) a list of all known *Iceryæ*, the following have been found:—

- I. rosæ*, var. *australis*, Maskell, 1893, Australia;
- I. crocea*, Green, MS., Ceylon;
- I. sp.*, Cockerell, MS., New Mexico;
- I. nudata*, Maskell, Australia.

The outline of this insect is much like that of *Cælostoma immane*, Mask., the gigantic Coccid from central Australia; but, apart from size and colour, the antennæ of the two show that they belong to different genera.

The figures 1 and 2 of my Plate XXIII. are taken from tracings of sketches sent to me by Mr. Olliff. Since the foregoing description was written intelligence has come of the lamented death of my friend, an event which all who are interested in science, especially in this quarter of the globe, must very deeply deplore. An earnest and energetic worker on the natural history of Australasia, his removal while still in the prime of life leaves a gap which may not be easily filled. Personally I have many recollections of pleasant and useful correspondence with him, although we never actually met; and I have been frequently indebted to him for hints, information, and other kinds of help, always promptly and generously given. Whilst, therefore, I mourn his loss as a co-operator in our branch of science, I must also regret the untimely loss of a friend.

***Icerya rosæ*, var. *australis*, Mask., 1893. Plate XXIII., figs. 7–11.**

Specimens of this insect received lately from Mr. Froggatt do not show the rows of yellow spots noted in my description (Trans. N.Z. Inst., vol. xxvi., p. 101). In other respects the specimens agree with my former ones. It is possible that the spots may be noticeable only at certain seasons. But I find also that in the specimens in my cabinet the spots have disappeared, although when alive they were quite conspicuous. It may therefore be also possible that the type of *I. rosæ* in

Florida may, when seen in the living state, also exhibit the spots. The differences which I noted in the Australian variety—the antennal joints of the adult and the arrangement of the larval hairs—will still stand good, and I shall leave it as a valid variety.

In November, 1895, Mr. Froggatt sent me a number of specimens of the adult male of this species. I believe I am right in saying that, up to the present time, no male *Icerya* has been reported except that of *I. purchasi*, Mask. It is therefore interesting to record now that of *I. rosæ*.

But after a careful examination I am unable to detect any characters of importance which may distinguish this male from that of *I. purchasi*. Probably one naturally expects to differentiate a new thing from what is already known; moreover, one would suppose that a male of one species should not resemble entirely that of another. In all the *Coccidæ*, however, it is difficult to separate the males; whether amongst the Diaspids, or the Lecanids, or the Monophlebids, they are all exceedingly alike. In *Sphærococcus* I have been obliged to postpone giving generic characters for the male precisely because that genus exhibits just what no other does—a marked difference amongst the males. I gave in my "Scale-Insects of New Zealand," 1887, plate ii., fig. 3, some type-forms indicating a means of separating the males of one *group* from those of another; but there is nothing that I know of at present which may serve in a similar way as between males of any particular genus. Probably there is such a thing, if one could discover it, because a male of, say, *Aspidiotus nerii* would not couple with a female of *Aspidiotus aurantii*, or a male of *Ctenochiton viridis* with a female of *Ctenochiton elæocarpi*: but I do not yet know what it is.

However, I append a description of the male of *I. rosæ* var. *australis*, premising that the general appearance seemed to me to be so near to that of *I. purchasi* that I wrote to Mr. Froggatt asking him if he were quite sure as to the collection of his specimens. In reply he assured me that he found both the adult females and the male cocoons on the same plant, and that the males which he had sent me had hatched out of these same cocoons in his own boxes. He also sent me a further supply of both females and cocoons together.

The male larva before changing to the pupa is very dark red, elliptical, slightly convex; length about $\frac{1}{16}$ in. The antennæ and feet are black. This larva is enclosed in a sac of thin white or slightly-yellowish wax, which is surrounded by much white cotton, and many of these sacs or cocoons are frequently massed together on a leaf. The antennæ have six joints, of which the first three are subequal, the next two shorter and equal, the last about as long as the fourth and

fifth together; each joint has a few hairs, and the last has two rather long. Feet rather long and slender, with some hairs; there is no tarsal digitule, and only one short bristle on the claw. The margin of the body bears a row of rather long hairs, and many similar hairs are on the dorsum; and at the posterior extremity there are six long setæ with tubercular bases. The epidermis is covered with numerous large circular multilocular spinneret-orifices. The eyes are small, tubercular. Rostrum large; mentum biarticulate.

The adult male is dark-red; length about $\frac{1}{15}$ in. The wings are dark-grey; nervure red; there are also two longitudinal white streaks. Abdomen distinctly segmented, and each segment bears some rather long hairs. The abdomen terminates in two cylindrical processes, which in life are turned upwards, and beneath and between which is the short subconical sheath from which issues the penis; each of these processes bears four long setæ. Eyes prominent, numerously faceted, nearly black. Antennæ black, with ten joints, of which the first two are tubercular, the next seven elongated and compressed in the middle, the last subcylindrical. All are about the same length except the two first, which are shorter and equal; the second bears two shortish hairs, the last has several much longer and irregularly arranged, and the seven intermediate ones bear each two sets of long hairs arranged in rings; so that the whole antenna has a plumose appearance. Feet long and slender, black; the tibia is twice as long as the tarsus; all the joints are hairy. There is only one digitule, which is a short fine bristle on the claw.

The original food-plant of this species I gave as *Hakea gibbosa*, and in 1893 Mr. Froggatt remarked that the insect was rare; but he tells me now that he has found it also on *Goodenia ovata*, but still in the same locality, near Sydney.

A comparison with the description and figures which I gave of the male of *I. purchasi* in vol. xix. of our Transactions, and also in my "Scale-Insects of New Zealand," 1887, will demonstrate the exceedingly close similarity between the males of the two species.

Genus TACHARDIA.

Tachardia decorella, Maskell, Trans. N.Z. Inst., 1892, p. 247.

In May, 1895, I received from Dr. Alcock, Superintendent of the Indian Museum, Calcutta, some specimens of Coccids stated to attack "tea- and forest-trees in India." They turned out, greatly to my surprise, to be *Tachardia decorella*. As no locality was given, and the "forest-trees" were not named, I could not form any definite judgment as to the likelihood of these insects being native to India or introduced from Austr-

lia; but the forest-trees being spoken of merely in general terms makes it seem most probable that they are indigenous to both countries. At some future time the species may be found in other tropical or subtropical lands.

INDEX TO PLATES XVI.-XXIII.

PLATE XVI.

Larval Characters of Coccidæ.

- Fig. 1. *Diaspidinæ*: a, abdomen; b, antenna; c, foot.
- Fig. 2. *Lecaninæ*: a, abdomen; b, abdomen after pressure; c, antenna; d, foot.
- Fig. 3. *Hemicoccinæ*: Letters as above.
- Fig. 4. *Acanthococcinæ*: Letters as above.

PLATE XVII.

Larval Characters of Coccidæ.

- Fig. 1. *Dactylopinæ*: a, abdomen of *Dactylopius*; b, abdomen of *Ripersia*; c, antenna; d, foot.
- Fig. 2. *Idiococcinæ*: a, abdomen of *Cylindrococcus*; b, abdomen of *Sphærococcus*; c, antenna; d, foot.
- Fig. 3. *Monophlebinæ*: a, abdomen of *Monophlebus*; b, abdomen of *Icerya*; c, antenna; d, foot.
- Fig. 4. *Brachyscelinæ*: a, abdomen of *Brachyscelis*; b, abdomen of *Tachardia*; c, antenna; d, abnormal antenna of *T. melaleucæ*; e, foot.

PLATE XVIII.

- Fig. 1. *Aspidiotus hakeæ*, insects on bark.
- Fig. 2. " abdomen of adult female.
- Fig. 3. " posterior extremity of second pellicle.
- Fig. 4. " diagram of larval pellicle.
- Fig. 5. " larva (early).
- Fig. 6. " second stage of male.
- Fig. 7. *Aspidiotus virescens*, insects on leaf.
- Fig. 8. " puparia, female and male.
- Fig. 9. " abdomen of adult female.
- Fig. 10. " margin of adult female, enlarged.
- Fig. 11. *Aspidiotus eucalypti*, var. *comatus*, abdomen of adult female.

PLATE XIX.

- Fig. 1. *Mytilaspis acaciæ*, female and male puparia on separate pieces of bark.
- Fig. 2. " abdomen of adult female.
- Fig. 3. *Mytilaspis banksiæ*, insects on leaf.
- Fig. 4. " adult female.
- Fig. 5. " abdomen of adult female.
- Fig. 6. *Mytilaspis melaleucæ*, abdomen of adult female.
- Fig. 7. *Chionaspis prunicola*, var. *theæ*, insects on leaf.
- Fig. 8. " puparia, female and male.
- Fig. 9. *Chionaspis spartinæ*, var. *natalensis*, insects on grass.
- Fig. 10. " puparia, female and male.
- Fig. 11. " abdomen of adult female.

PLATE XX.

- Fig. 1. *Pulvinaria thompsoni*, insects on branch.
 Fig. 2. " female and sac, enlarged.
 Fig. 3. " diagram of adult female.
 Fig. 4. " antenna of adult female.
 Fig. 5. " last joint of antenna, enlarged.
 Fig. 6. " foot of adult female.
 Fig. 7. " spiracle and marginal spines of adult female.
 Fig. 8. " test of male pupa.
 Fig. 9. Undetermined Hemicoccid, insects on leaf, second stage.
 Fig. 10. " insect, second stage, enlarged.
 Fig. 11. " diagram of female, second stage.
 Fig. 12. " antenna of female, second stage.
 Fig. 13. " foot of female, second stage.
 Fig. 14. " marginal spines of female, second stage.
 Fig. 15. " abdominal extremity of female (after pressure).
 Fig. 16. " larva.
 Fig. 17. " antenna of larva.

PLATE XXI.

- Fig. 1. *Prosopophora atherosperma*, insects on bark.
 Fig. 2. " adult female in test, enlarged.
 Fig. 3. " test of male pupa.
 Fig. 4. " diagram of adult female.
 Fig. 5. " antenna of adult female.
 Fig. 6. " diagram of abdominal extremity of adult female.
 Fig. 7. " spiracular spines of adult female.
 Fig. 8. " perforated discs and figure-of-eight spinnerets.
 Fig. 9. *Eriococcus spiniger*, diagram of female.
 Fig. 10. " antenna of female.
 Fig. 11. " marginal spines of female.
 Fig. 12. *Lachnodius lectularius*, insects on twig.
 Fig. 13. " adult female, enlarged.
 Fig. 14. " antenna of adult female.
 Fig. 15. " foot of adult female.
 Fig. 16. " abdominal extremity and anal ring of adult female.
 Fig. 17. " marginal spines of adult female.
 Fig. 18. " larva.
 Fig. 19. " marginal spines of larva.

PLATE XXII.

- Fig. 1. *Lachnodius hirtus*, insects on branch.
 Fig. 2. " diagram of hairs of female.
 Fig. 3. " antenna of female.
 Fig. 4. " foot of female.
 Fig. 5. " anal ring of female.
 Fig. 6. " rostrum and mentum of female.
 Fig. 7. " larva.
 Fig. 8. " antenna of larva.
 Fig. 9. " marginal spines of larva.
 Fig. 10. *Sphaerococcus obscuratus*, insects in blisters on bark.
 Fig. 11. " some blisters cut open.

- Fig. 12. *Sphærococcus obscuratus*, diagram of adult female.
 Fig. 13. " antenna of adult female.
 Fig. 14. " wrinkles and chitinous bands of abdomen of adult female.
 Fig. 15. " larva.
 Fig. 16. " antenna of larva.
 Fig. 17. " gamasid mite parasite.

PLATE XXIII.

- Fig. 1. *Icerya nudata*, adult female, side view.
 Fig. 2. " adult female, dorsal view.
 Fig. 3. " antenna of female.
 Fig. 4. " foot of female.
 Fig. 5. " diagram of larval spinnerets and marginal hairs.
 Fig. 6. " antenna of larva.
 Fig. 7. *Icerya rosæ*, var. *australis*, diagram of male larva.
 Fig. 8. " antenna of male larva.
 Fig. 9. " adult male.
 Fig. 10. " abdominal extremity of male.
 Fig. 11. " antenna of male.

ART. XXXIX.—Contributions towards a Monograph of the Aleurodidæ, a Family of Hemiptera-Homoptera.

By W. M. MASKELL, Registrar of the University of New Zealand, Corr. Mem. Roy. Soc. of South Australia.

[Read before the Wellington Philosophical Society, 26th February, 1896.]

Plates XXIV.-XXXV.

THE attention of systematic entomologists has perhaps been less directed to the *Aleurodidæ* than to any other family of insects. The bibliography attached to this paper contains, indeed, a fair number of names, but the majority of these writers have either simply repeated the phrases of their predecessors, or made only quite trivial observations, or manifested but slight acquaintance with the family. The number of species reported is exceedingly small; and yet these insects are found in almost every country, and infest a great variety of plants, and it is certain that a little trouble on the part of collectors and observers would discover a large number of species now quite unknown. In this paper I shall include more than twenty forms which I believe to be new. These forms have come under my notice in connection with my studies of the homopterous family of the *Coccidæ*, most of them having been sent to me as specimens of that family. Were I able now to do any collecting myself in New Zealand (which unfortunately is not the case) I am sure that I could